630.7
G292c
no.20

UNIVERSITY OF
ILLINOIS LIBRARY
AT URBANA-CHAMPAIGN
ACES

630.7
G292c
No.20

AGX

~~Reference file~~

~~Agricultural Library~~

Georgia State College of Agriculture

Andrew M. Soule, President

Extension Division

J. Phil Campbell, Director

Athens, Ga. JANUARY, 1916 Circular 20

Co-operative Extension Work in Agriculture and Home Economics, Georgia State College of Agriculture and United States Department of Agriculture co-operating.

Rock Phosphate

Jno. R. Fain, Professor of Agronomy

Great interest is being manifested this year in the use of rock phosphate in place of acid phosphate on account of the increased price of the latter. The use of rock phosphate must be considered from the standpoint of a general policy of soil-building rather than for immediate returns. Farmers who use rock phosphate should be in a position to make investments and wait on returns, though there may be exceptions to this rule.

A good many reports of the benefits secured from rock phosphate are somewhat misleading in that they represent the cumulative effect of a general policy of soil-building through a series of years. If rock phosphate is used with the understanding that, with its continued use, the effects will be cumulative, and it is a part of the general policy of soil building, its use will be a good thing; but to use it on the average Georgia soil, with expectations of immediate returns, will probably be disappointing in most cases.

A plentiful supply of organic matter in the soil is essential for the success of rock phosphate; and for most of the soils of Georgia, it will take some time to accumulate a sufficient amount. It will also take some time to get the rock phosphate thoroughly distributed through the soil so that it will be in contact with the decaying organic matter.

The best use of rock phosphate is probably in connection with stable manure, especially where the rock phosphate is distributed in the stalls each day and the manure allowed to accumulate sometime before it is put on the fields.

Experiments with rock phosphate have been carried on by the College for the last three years in connection with field tests with fertilizers in different parts of the state. Rock phosphate was used on cotton at the rate of 3,000 pounds per acre, being applied only once in the course of the rotation. Corn followed the cotton crop, and oats the corn, and cowpeas followed the oats. No attempt was made to secure returns from cowpeas. On each acre a green crop was plowed down during the course of the rotation. In most cases, two green crops, cowpeas and a cover crop between the cotton and the corn. At present, work is in progress at some 27 points in the state, but it has not been possible to secure as much as three years' results except from 10 of them.

The returns from the use of rock phosphate in south Georgia have been somewhat more marked than in north Georgia. This might be expected for two reasons; first, the phosphorus content of the soils of south Georgia is, as a rule, lower than those of north Georgia; second, returns from sandy soils are usually obtained quicker than from the heavier soils prevalent in the northern part of the state. Results on cotton and corn have been obtained from five points in north Georgia and five points in south Georgia for three years, while results from the oats have been obtained only for two years. Returns from corn and oats in north Georgia have been practically nothing, an increase of only 19½ pounds of seed cotton on an average having been obtained, while in south Georgia an increase of 73½ pounds of seed cotton per acre was obtained. An increase of only about 2 bushels of oats and a little less than 2½ bushels of corn resulted.

It will be seen from the foregoing that the use of 3,000 pounds of rock phosphate per acre has not been a profitable investment so far as one course of the rotation is concerned. Probably in the second and third course of the rotation the results will begin to show more favorably. This will depend somewhat on the amount of organic matter turned under as green crops. In turn the size of the crops will depend somewhat on the season.

The accumulation of organic matter, under conditions such as exist in Georgia, is rather slow; and, beginning, as is necessary in most cases, with soils rather deplete in organic matter, it will take some time to accumulate an amount necessary to secure returns from the rock phosphate. With soils that are depleted in organic matter by cotton cultivation, it is not to be expected that turning under one or two green crops will increase the organic content to any great extent. This is especially true since climatic conditions favor rather rapid decay.

From the results mentioned and from results in other parts of the country, rock phosphate can not be recommended for immediate returns, but can be recommended to farmers who are in a position to make an investment in a permanent soil-building proposition, and who can wait until the second and third cycle of the rotation for returns.

A small amount of rock phosphate used each year on the demonstration field at the College, as compared with acid phosphate, has given somewhat more favorable results. This may be due to several causes. Probably in part to the fact that better crops of cowpeas have been grown and turned under than at other points in the state. Where 400 pounds of rock phosphate have been compared with 400 pounds of acid phosphate in corn production, over a period of five years, it shows an increase of something over 5 bushels of corn per acre for each year. This amount of rock phosphate applied to cotton each year for the past two years has shown about the same increase that was secured from the larger applications over the state; that is, about 75 pounds of seed cotton per acre.

It must not be concluded from such results that rock phosphate is of no use. As has already been indicated, its place is in the general scheme of soil building and it might be well in this connection, to point out what reasons there are for using rock phosphate and how it should be used in a general scheme of soil building.

A study of the soils of Georgia will show, as is usually the case with most soils of this country, that the phosphoric content is quite low. In seeking to supply this deficiency, cost, of course, has to be considered. Unquestionably rock phosphate is about the cheapest fertilizer that can be had. But it is not a question of how cheap but how can returns be had from it?

Our soils are also low in organic content and nitrogen. Any scheme, therefore, of general soil building will include supplying both phosphorous and nitrogen.

Stable manure is universally recognized as an excellent fertilizer because it not only carries some of the mineral element of nitrogen but also because it supplies organic matter. Stable manure itself, however, is deficient in phosphorus, but when reinforced with phosphorus it gives returns sufficiently great to more than pay the cost of the phosphorus which is purchased in the form of ground rock and applied. Then the question is, how the stable manure can best be used in a general scheme of soil building?

Manure can be utilized to stimulate the growth of legumes to better advantage than most any other material. Since legumes are valuable in increasing the nitrogen content of the soil, some method of using manure with legumes is, therefore, important to consider. It is recommended that from three to five tons of stable manure per acre be used for a legume. The manure may be reinforced with 40 pounds of rock phosphate per ton and turned under. Good returns are secured, as a rule, from using 3 to 5 tons of manure. Heavy applications, as a rule, do not make as great returns per ton as smaller applications.

Only forty pounds of rock phosphate are recommended per ton of manure, because this provides a proper fertilizer balance, but this amount with from 3 to 5 tons of manure will only give from 120 to 200 pounds of rock phosphate per acre. This will not be sufficient to have any very decided influence in soil building. Additional amounts, therefore, can be broadcasted at the time of planting cowpeas. It is probably best not to use less than 1000 pounds per acre where applied every two to three years, but if the user can afford to wait for returns on larger investments, it will be better to apply a ton or more per acre. This can be done without any fear of loss of phosphorus by leaching, since very little of it leaches out of the soil, and when applied in non-soluble form, it must become soluble before it can leach.

A fertilizing scheme of this kind meets the requirements in a majority of our soils, namely, organic matter, nitrogen and phosphorus. A crop rotation should be practiced on every farm, with provisions for applying the manure to the legume and the legume to be turned under. Then if the rock phosphate is applied the decaying organic matter of the manure and the legume will help render the phosphorus available and at the same time supply two very decided deficiencies in our soils.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 079965957

METAL EDGE, INC
Ph Range 8.0 To 10.0
Acid Free
Tested P.A.T.
2008
800-862-2228